

Evaluation of Effects of Counterfeit R-134a on Seals and Hoses (Task N.0815)

Statement of Need

Dangerous forms of counterfeit or contaminated R-134a (1,1,1,2-tetrafluoroethane or HFC-134a) has been found in refrigerant supplies worldwide. These refrigerant blends may be flammable or contain banned chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs). Documented instances include military vehicles returning from Afghanistan that had their Air Conditioning (A/C) systems serviced while deployed there. The Army's Tank Automotive Research, Development and Engineering Center (TARDEC) is working to develop procedures for the identification and safe removal of contaminated refrigerant blends in vehicles. In order to finalize these procedures, the Army needed to understand the effects of the contaminated blends on A/C system seals and hoses.

Technical Approach

Under this task, the NDCEE analyzed the effects of various counterfeit refrigerant mixtures on seals and hoses typical of those found in vehicle A/C systems. This was done by creating fifteen representative counterfeit refrigerant blends and using them to pressurize test apparatus constructed of a variety of connected A/C hoses and seals. These pressurized apparatus were maintained in a hot-dry temperature cycle environment for six months or until failure, demonstrating the long term effect of the refrigerant blends on seals and hoses. After the conclusion of the demonstration, the hoses and seals were subjected to laboratory inspection and analysis to identify and characterize any failures or identifiable effects the blends had on the test material. This demonstration will enable TARDEC, the Tank-Automotive and Armaments Command (TACOM), and installations where Army vehicles are serviced to finalize and implement counterfeit refrigerant discharge and replacement procedures for their vehicles. Additionally, the NDCEE performed a regulatory review of draft procedures to ensure compliance with United States (US) Federal Laws and Regulations.

Results and Benefits

These results provided an objective analysis of the effects of hazardous refrigerant replacements on A/C systems hoses and seals. Based on test results, certain seal materials seem particularly vulnerable to specific counterfeit refrigerant types. This will provide the basis to make an informed, fact-based determination of which items need to be replaced as part of the new standard procedure TARDEC is developing for A/C systems where counterfeit refrigerant is detected. If TARDEC determines that some combinations of counterfeit blends and materials do require replacement, it could potentially save hundreds of dollars in parts and labor for each affected vehicle. In addition, the regulatory review conducted on the draft procedures has ensured they are safe, effective, and fully environmentally compliant.

Technology Transfer and Outreach

TARDEC anticipates rapid adoption of the counterfeit refrigerant discharge and replacement procedures in order to address this pressing problem. In addition, these results may be applicable to contaminated A/C systems in other service branches.

Government POC
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Status
Complete

